Indiana Department of Natural Resources
Division of Forestry
DRAFT
RESOURCE MANAGEMENT GUIDE

Harrison-Crawford State Forest **Compartment: 14 Tract: 11**
Dieter Rudolph **Date: December 28, 2009**
Additional information by Dwayne Sieg (October 2012)

Acres Commercial Forest: 86
Acres Noncommercial Forest: 0
Acres Permanent Opening: 17
Acres Other: 0

Acres Total: 103

Basal Area >= 14 inches DBH: 43.28 sqft/ac
Basal Area < 14 inches DBH: 63.95 sqft/ac
Basal Area Culls: 5.79 sqft/ac
Total Basal Area: 106.89 sqft/ac

Number Trees/Acre: 293

Species	Harvest Volume(MBF)	Leave Volume(MBF)	Total Volume(MBF)
American Beech	0	0	0
American Elm	0	0	0
American Sycamore	3.71	51.06	54.77
Basswood	3.08	0	3.08
Black Cherry	0	5.76	5.76
Blackgum	0	0	0
Black Oak	1.92	5.44	7.36
Black Walnut	2.73	16.59	19.32
Boxelder	0	1.95	1.95
Chinkapin Oak	4.27	15.18	19.45
Dogwood	0	0	0
Eastern Red Cedar	79.08	13.71	92.79
Eastern White Pine	51.66	60.35	112.01
Hackberry	0	0	0
Ironwood	0	0	0
Northern Red Oak	0.97	11.31	12.28
Ohio Buckeye	0	2.62	2.62
Pignut Hickory	0	2.05	2.05
Redbud	0	0	0
Scarlet Oak	0	2.53	2.53
Shagbark Hickory	0	15.57	15.57
Silver Maple	0	11.23	11.23
Sugar Maple	3.5	8.06	11.56
Virginia Pine	0	0	0
White Ash	3.84	18.23	22.07
White Oak	0	15.78	15.78
Yellow Poplar	16.47	41.23	57.7
Total	171.23	298.65	469.88
Total per acre	1.67	2.91	4.58

Location

This 103 acre tract is located in Crawford County, Indiana. It is in section 28 T3S R2E. The tract contains Wyandotte Lake and is near the Wyandotte Cave complex.

General Description

This tract is located off of SR 62 with Wyandotte Lake and Sharpe Spring running through it. Due to the proximity of the Wyandotte Cave complex, this tract has a high amount of karst activity within it. The land has a system of firetrails running through it as well as the house of a DNR employee. The area around Wyandotte Lake contains a public parking lot. There is also a septic system mound for the Wyandotte Cave Complex in the northern section of the tract.

In terms of forest, this tract had multiple sub-stands (referred to as stands in this discussion). The Bottomland Hardwoods stand (13 acres) can be found along Sharpe Spring and the Blue River as well as some of the lowland areas. The Cedar stand (6 acres) and one of the White Pine stands (7 acres) are found at the top of the central hill. The second White Pine stand is off of the firetrail near the house. The Field stand (8 acres) is made up of the area around Wyandotte Lake (including the parking lot), the firetrails, sewage mound, and home. The Old Field stand (18 acres) is found in the flatlands near the edges of the tract while the Old Field Degraded stand (7 acres) is north of the central hill on either side of the firetrail. The Oak Hickory stand (11 acres) and Mixed Hardwood stand (24 acres) split the side of the central hill with the Oak Hickory being on the western side and Mixed Hardwoods on the eastern side.

History

This land was bought in a single purchase from the Wyandotte Cave Company. The total purchase was 1174 acres and occurred in 1966. Up until the late 1950s-early 1960s, the Wyandotte Post Office was located in the tract. The residence mentioned above should be one of the oldest within the State Forest system, reportedly built in the mid 1800s. The majority of this tract was open ground in 1940, with no more than 25% of the tract's area being forested. Wyandotte Lake was built sometime after 1940 (doesn't show up in the aerial photo of that year) and was a pay lake before State acquisition. The lake dam was replaced ca. 2003.

In 1977, 5 'reps' of a black walnut progeny test was planted just west of the residence. 5 reps of a tulip poplar progeny test were also planted that year in the same vicinity. It is uncertain of the reason(s) why, but these plantings (especially the black walnut) generally failed. By 1985, the walnut had suffered high mortality and showed indications of an unsuitable soil for that species.

Ca. 2001, minor TSI work was done along the Sharpe Creek to do grape vine control.

Landscape Context

1411 is part of a contiguous body of land owned by the State of Indiana and is almost completely surrounded by state land. There is a small parcel of land bordering the southernmost portion of the tract that is privately owned. The rest of the surrounding land is owned by the state. The tract to the northeast of the tract is the parcel containing the Wyandotte Caves complex, a 58 acre parcel operated by the Division of State Parks. The main landscape description within a radius of 2 ½ miles would be that of mostly forest with small amounts of open ground (mostly grassland) and some scattered, single family residences. Mulzers' limestone quarry, a couple highways and various county roads occupy that same area. A good stretch of the Blue River is also nearby.

Topography, Geology, and Hydrology

The majority of the land is flat with one moderate hill in the middle of the tract. Overall change in elevation is around 120 feet. Sharpe Spring Creek and Wyandotte Lake are waterways within the tract and the Blue River is the southeastern boundary for the tract. The Blue River acts as the major watershed for this area.

The geology of this tract involves an underlayment of limestone. Testament to this is by the numerous caves and springs in the immediate area. Sharpe Springs Creek comes from Sharpe Spring which is located just to the west of the tract. There are also three caves within the tract. Sibert's Well Cave is located in the northern section of the tract near the sewage mound. Turtle Hole and Turtle Cave are both found on the sides of the central hill.

The original surface area of Wyandotte Lake was about 9 acres. Sedimentation decreased the area to about 7 acres in 1998, 4 acres in 2005, and 3 acres by 2011.

Soils

Alford Silt Loam (AcuB2)

The Alford series consists of very deep, well drained soils formed in loess. These soils are commonly on loess hills and less commonly on outwash plains. The surface horizon consists of silt loam which is a light yellowish brown color, which is 6 inches deep. The subsoils consists of 4 horizons that accumulate more clay the further down the profile. The subsoil is 66 inches thick. These subsoil horizons are mainly a silty clay loam with the last horizon before the parent material is a silt loam. The last horizon starts at 72 inches and is a brown silt loam with weak structure. The permeability of this soil is moderate. The mean annual temperature is about 56, the mean annual precipitation is 42 inches.
Degree Slope: 2-60%
Site Index: 70
Growth Range Potential: 342
Management Concerns: Runoff and erosion

Corydon Stony Silt (CqyG)

The Corydon series consists of shallow, well drained soils that formed in as much as 8 inches of loess and in the underlying limestone residuum. The Corydon soils are on hills underlain with limestone. The surface horizon is 8 inches of a silt loam. The subsoil is 9

inches of clay. The bottom of the profile is unweathered bedrock. Mean annual precipitation is about 44 inches, and mean annual air temperature is about 54 degrees F.
Degree Slope: 20-60%
Woodland suitability group: 1o8
Site Index: 64
Growth Range potential: 258
Management Concerns: runoff and erosion

Crider Silt Loam (CrB2, CrC2, CsB3, CsC3, CtC2) Deep, gently sloping and moderately sloping well-drained soils on uplands. Surface layer is dark-brown silt loam about 8 inches thick. Subsoil is about 62 inches thick. Moderate in content of organic matter and in natural fertility. Available water capacity is high and permeability is moderate. Typically, these soils are eroded. Runoff is medium to rapid.
Degree Slope: 2-12%
Woodland Suitability Group: 1o1
Site Index: 85-95 (Upland Oaks)
Growth range potential (Upland oaks): 300-375 bd.ft./acre/year
Management Concerns: Runoff and erosion

Haggatt Silt Loam (HarE2, HarD2) Silty Clay (HafC3, HafD3)
The Haggatt series consists of deep, well-drained soils formed in clayey residuum that can be capped with up to 20 inches of loess. They are on hills and in sinkholes underlain with limestone. The Surface Horizon is a silt loam that is 5 inches thick. The first 11 inches of the subsoil is a silty clay loam. The next 28 inches of the subsoil is clay. The bedrock is fractured, indurated limestone bedrock. Mean annual precipitation is about 43 inches, and mean annual temperature is about 54 degrees F.
Degree Slope: 2-25%
Woodland suitability group: 1o1
Site Index: 68
Growth Range potential: 300
Management Concerns: runoff and erosion

Haymond Silt Loam (HcgAH, Hm)
The Haymond series consists of very deep, well drained, soils that formed in silty alluvium. These soils are on flood plains and flood-plain steps. Slope ranges from 0 to 3 percent. Mean annual air temperature is about 55 degrees F, and mean annual precipitation is about 42 inches. The surface horizon is a brown silt loam plow layer that extends approximately 10 inches. The first subsurface horizon is a dark yellowish brown silt loam that extends to 25 inches. The second subsurface horizon is a yellowish brown silt loam that extends until 44 inches. The stratum is a massive yellowish brown fine sandy loam.

Markland Silty Clay (McpD3)
The Markland series consists of very deep, well drained soils on lake plains. They formed in thin loess and the underlying calcareous, fine-textured lacustrine sediments. The surface horizon is a pale brown silt loam which extends for approximately 4 inches. The

subsoils are comprised of two horizons of increasing clay. These horizons are yellowish silty clay. The two horizons are 24inches thick. The next three horizons are comprised of increasing clay and calcium. These soils are a yellowish brown silty clay loam. These three horizons are 31 inches thick. The final horizon is the substratum which is a yellowish brown silty clay loam with weak structure. The permeability is moderalty slow to slow. The mean annual precipitation is 43 inches and the mean annual temperature is 54 degrees F.
Degree Slope: 12-50%
Site Index: 72
Growth Range Potential: 342
Management Concerns: runoff and erosion

Access

A firelane beginning near the 'base' of Wyandotte Cave road runs through this tract towards the septic system mound. Another access lane runs by the residence and ties into the previously described trail. The parking lot for Wyandotte Lake acts as an access point to the southern section of the tract. A foot trail then runs along Sharpe Spring Creek.

Boundary

Wyandotte Lake and Sharpe Spring Creek as well as a second creek feeding into Sharpe Spring Creek make up the entire western boundary. The Blue River makes up the southeastern boundary with SR 62 running through a portion of the tract. The northeastern boundary is defined by the fire trail at the base of the hill on which the Wyandotte Cave property is located.

Invasive Species

The aquatic plant, Brazilian elodea, a common aquarium plant, was identified as being present in Wyandotte Lake ca. 2005. It is guessed that this species was introduced by someone either emptying an aquarium or a boat's live well into the lake. The main concern with this plant is the possibility that it would escape into Blue River, though it doesn't seem to thrive in moving water and hasn't been found in Blue River so far. Since 2005, 2 seasons of treatments with the aquatic herbicide, Sonar, have taken place. While treatments temporarily controlled this plant, it was back strongly by 2011. Less effective than the recommended product, Reward, Sonar was an accepted herbicide under FSC certification standards. 2 options are available outside the already tried approach. First, is to obtain a derogation from the certifiers to allow the use of Reward. Second is to drain Wyandotte Lake for a year or two. However, there was no drain mechanism installed when the dam was replaced. Save breaching the dam, draining the lake is unfeasible. Sediment removal by mechanical dredging the lake is being considered. Besides restoring open water for recreation purposes, deepening the lake would reduce sunlight reaching the bottom and discouraging the presence of this invasive species.

The species, Japanese chaff flower was discovered along the entrance road to Wyandotte Lake in 2011. A local botanist, Wm. Thomas, reported the plant and that he had pulled up the few specimens he found. In a subsequent report in May 2012, Mr. Thomas said that he found no more of these plants at that location.

Wildlife and Plant Species of Special Concern

A Natural Heritage Database Review was completed. If Rare, Threatened or Endangered species were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

Habitat feature trees exceed maintenance levels for all diameter classes except for legacy and snag trees >20 & 19"DBH respectively.

The lower number of larger feature trees is likely due to the smaller trees in the Old Field, Old Field Degraded, and Cedar stands, all of which were comprised mostly of trees in the low teens.

Wildlife species that were noted on this stand were those typical of the area. Evidence of deer, coyote, squirrels, chipmunks, raccoons, and turkey were seen in the area as well as a wide variety of bird species. The lake and creek offer a water source for these species while also creating habitat for multiple amphibious species. The presence of oak and hickory species creates a source for hard mast which is beneficial to multiple wildlife species.

Wildlife Habitat Feature (Tract Wide)

Category	Maintenance level	Optimal Level	Inventory	Available Above maintenance	Available Above Optimal
Legacy Trees *					
11"+	927		1219	292	
20"+	309		121	-188	
Snags (all species)					
5"+	412	721	2866	2454	2145
9"+	309	618	1101	792	483
19"+	51.5	103	15	-36	-88
Cavity Trees (all species)					
7"+	412	618	550	138	-68
11"+	309	412	426	117	14
19"+	51.5	103	167	115	64

* species include: AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Indiana Bat

As management activities are currently only performed in the winter months due to voluntarily self imposed Indiana bat management restrictions, it is unlikely that direct harm will come to the Indiana bat as they are hibernating in nearby caves at this time. Any skid trails/haul roads created in this tract could improve the habitat for the Indiana bat by improving the canopy foraging conditions due to the reduction of understory clutter. Furthermore, the areas around likely roost trees can be opened up to benefit the

bat. The edge of log yards can increase the solar exposure of roost trees which improves the microclimate and thermal conditions of the roosting areas.

Trees that are ideal for roosting bats such as large snags and large trees that have loose/exfoliating bark can be retained to provide for the Indiana bat. Furthermore, the growth of ideal tree species for the Indiana bat can be managed to promote growth to increase the recruitment of trees into the categories suitable for the Indiana bat. See discussion above concerning habitat feature trees.

Recreation

A foot trail, "Buckeye Trail", goes around Wyandotte Lake. The back side (southwest) of this trail shows little use by hikers and is not well maintained. A segment of the "United For Horses" trail runs just outside of the northwestern and southwestern boundaries of the tract. Wyandotte Lake facility contains a boat ramp and a small shelter house with parking. The lake, itself, has seen decreasing recreational use, due to the advanced filling in of the lake. The lake is being used by trappers and occasional dog retriever trials. The three caves in the tract have also been used by local spelunkers, the most popular of them being Sibert's Well Cave. At this time, wild caves are closed to public use, due to the threat of the White Nose Syndrome, a disease affecting cave dwelling bat species. The recreation facilities within this tract are currently maintained by the O'bannon Woods State Park.

Cultural

Cultural resources may be present on the tract but their location(s) are protected. Adverse impacts to significant cultural resources will be avoided during any management or construction activities.

Summary Tract Silvicultural Description, Prescription, and Proposed Activities

Bottomland Hardwoods (13 acres)

The bulk of this stand is located between SR 62 and the Blue River. Other portions of this stand are found along the creek and Wyandotte Lake. There was a total volume of 4,550 bf/ac with a basal area of 112.8 sqft/ac. The majority of the volume came from large American sycamores. Most of the larger trees contributing to this high volume were found between SR 62 and the Blue River in an area that is not very accessible to heavy equipment. Due to the equipment limitations, this stand is not a likely candidate for a harvest or timber stand improvement at this time.

Cedar (6 acres)

This small stand was located on the top and a portion of the northeastern side of the central hill. It contained 7,990 bf/ac and 145 sqft/ac. Of this, 7,270 bf/ac were eastern red cedar. This stand would be a good candidate for a harvest of the cedar component to thin the stand and allow for the hardwood growth to succeed into the overstory. If this harvest occurred, the stand would be moved towards a stand consisting primarily of oak

species (black, chinkapin, and white oak). The basal area would then be reduced to around 70sqft/ac which would aid in the oak regeneration.

If a harvest were to occur, it should be linked with the white pine stand on top of the central hill in order to group the two softwood stands together.

White Pine (7 acres)

This stand was in two portions, one on top of the central hill and the second near the private residence. These 2 groups were planted at different times, with the one nearest the residence much younger than the other. The white pines in this stand were large and would benefit from a thinning to insure quality growth with the remaining individuals. In total, there was a volume of 17,870 bf/ac and a basal area of 200 sqft/ac. The high volume is likely slightly skewed due to the few sample points that occurred within this stand but still indicates a high volume. Roughly half of this volume can be removed in the commercial thinning.

As previously stated, this thinning should coincide with the harvest of the Cedar stand. Only the White Pine stand on top of the central hill should be thinned in order to reduce the disturbance to the private residence within the tract. As these two stands are small, their thinning/harvest is a lower priority but would increase the hardwood component and the growth rate if performed.

Mixed Hardwoods (24 acres)

This stand, the largest, is located on the slopes of the eastern half of the central hill. There was a total volume of 3,970 bf/ac and 98.9 sqft/ac. Most of these trees had a diameter 13-19". While a thinning would increase the growth rate of the remaining trees, only 13.7 sqft/ac and 800 bf/ac were deemed removable at this time. The low volume and basal area make a thinning hardly worthwhile in this stand. Therefore, this stand should be left to grow on its own, for the near future, keeping it as a mixed hardwoods stand.

Oak Hickory (11 acres)

This stand was found on the slopes of the southwestern half of the central hill. This stand was a closed canopy forest as far back as 1940. With 4,780 bf/ac and 130.6 sqft/ac, this stand would be another candidate for a thinning. Half of the total volume from this stand came from eastern red cedar. Due to the high amount of cedar and the proximity to the cedar stand, this stand would benefit from a removal of the cedar component occurring at the same time as the softwood harvest. By removing the cedar, this stand would have around 2,000 bf/ac and 95 sqft/ac of oak growth. This thinning would keep the stand as a oak hickory stand, but would remove the competition of the cedar allowing the black, chinkapin, red, scarlet, and white oaks present to prosper.

Old Field (18 acres)
Located in multiple sections throughout the tract, this stand consisted almost entirely of small trees. The trees that occur throughout this stand are mostly undesirable in terms of forest harvesting but provide species diversity and wildlife habitat. The stand currently has 1,770 bf/ac and 123 sqft/ac and should be left alone for the time being due to this stand is scattered throughout some of the more delicate areas (the creek, sewage mound, and residential area). The black walnut and yellow poplar progeny tests described in the history section are located in this and the following 'Old Field Degraded' stand.

Old Field Degraded (7 acres)
Like the Old Field stand, this stand should be left alone at this time. It is mainly made up of eastern red cedar which branches a couple of feet above the ground. There is next to no timber value within this stand, but the dense, low branching cedar provides habitat and creates thermal cover for wildlife for the winter months.

TRACT ACCOMPLISHMENT RECORD
Compartment 14, Tract 11

DATE PLANNED	ACTIVITY / REMARKS	DATE COMPLETED
2012	(Fall) Check lake entrance for J. chaff flower	10-9, 2012
2012-14	Secure derogation and Treat B. elodea with Reward	
2013-	Monitor lake entrance area for J. chaff flower	
2015-20	Wyandotte Lake sediment removal	
2019	Conduct tract inventory	

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